National Starch & Chemical Co.	**)**	**Departmental**
Aroostook County	**)**	**Findings of Fact and Order**
Island Falls, Maine	**)**	**Air Emission License**
A-274-71-J-A	**)**	**Amendment #1**

After review of the air emissions license minor modification application, staff investigation reports and other documents in the applicant's file in the Bureau of Air Quality, pursuant to 38 M.R.S.A., Section 344 and Section 590, the Department finds the following facts:

I. REGISTRATION

A. Introduction

1. National Starch & Chemical Company (National Starch) of Island Falls, Maine was issued Air Emission License A-274-71-I-R on November 20, 2000, permitting the operation of emission sources associated with their facility.

2. National Starch has requested a minor modification to their license to replace Boiler #2 with a 1998 Cleaver Brooks boiler.

II. MODIFICATION DESCRIPTION

A. Description of Change

Fuel Burning Equipment Change

Equipment	Power Input (MMBtu/hr)	Fuel Type, % Sulfur	Firing Rate (gal/hr)
Old Boiler #2	13.4	#6, 0.7	88
New Boiler #2	16.3	#6, 0.5	109

Boiler #2 is a Cleaver Brooks, four pass boiler, firing 0.5% sulfur #6 fuel oil, manufactured in 1998 rated at 16.3 MMBtu/hr. As such, Boiler #2 is subject to New Source Performance Standards (NSPS) Subpart Dc, which is applicable to boilers with a heat input between 10 MMBtu/hr and 100 MMBtu/hr and manufactured after June 9, 1989.

BACT for Boiler #2 is the following:

- SO_2, NO_x, CO and VOC emission rates are based on AP-42 data dated 9/98 for oil fired boilers firing #6 fuel (0.5% sulfur and 0.4% fuel bound nitrogen) and having a heat input of 10 to 100 MMBtu/hr.
- Fuel sulfur content shall not exceed 0.5% by weight as documented per 40 CFR 60.48c(f)(2).
- Emission rates for PM are regulated by MEDEP Regulations, Chapter 103.
- Stack #2 shall be at least 60 feet AGL by February 28, 2001.
- Opacity from Stack #2 shall not exceed 30% on a 6 minute block average, except for no more than 2 six minute block averages in a 3 hour period.

B. Application Classification

The modification of a minor source is considered a major modification based on whether or not expected emission increases exceed the "Significant Emission Levels" as given in Maine's Air Regulations. This modification is determined to be a minor modification and has been processed as such.

C. Revised Facility Emissions and Fuel Use Caps

The following total licensed annual emissions for National Starch are based on the following raw materials used. All usages are based on a 12 month rolling total.

- 11,031 tons/year of wood/starch/shredded waste (8100 Btu/lb, 10% moisture), or equivalent, in Boiler #1. This is based on operating 8,760 hours per year.
- 774,000 gallons per year of #6 fuel (0.5%S maximum by weight) total in Boilers #1 and/or #4.
- 953,672 gallons per year of #6 fuel (0.5%S maximum by weight) in Boiler #2.

Total Allowable Annual Emissions for the Facility
(used to calculate the annual license fee)

Pollutant	Tons/year
PM	26.7
PM_{10}	26.7
SO_2	88.0
NO_x	86.2
CO	39.2
VOC	4.3

III. AMBIENT AIR QUALITY ANALYSIS

A. Overview

A combination of screening and refined modeling was performed to show that emissions from National Starch, Inc. of Island Falls, would not cause or contribute to violations of Maine Ambient Air Quality Standards (MAAQS) for SO_2, PM_{10}, NO_2 and CO. MEDEP-BAQ determined that National Starch's facility does not consume increment because current emissions are below baseline emissions for all pollutants. Therefore, no increment analyses were performed.

B. Model Inputs

The SCREEN3 model was used to determine the worst-case operating load and the SO_2, PM_{10}, NO_2 and CO significant impact areas.

The ISCPRIME model was used in refined simple terrain mode to address standards in all areas including the cavity region. In addition, the COMPLEX-I VALLEY (CI-VM) model was used to evaluate impacts in intermediate and complex terrain, i.e., areas where terrain elevations exceed the proposed stack-top elevations.

All modeling was performed in accordance with all applicable requirements of the Maine Department of Environmental Protection, Bureau of Air Quality (MEDEP-BAQ) and the United States Environmental Protection Agency (USEPA).

A valid five (5) year hourly meteorological off-site database was used for the refined modeling. The wind data was collected at a height of ten (10) meters at the Caribou National Weather Service (NWS) meteorological site during the five (5) year period 1985-1989. Missing data were interpolated or coded as missing. Surface data collected at Loring Air Force Base were substituted for missing data. Hourly cloud cover, ceiling height and surface wind speed from Caribou NWS were used to calculate stability. Hourly mixing heights were derived from surface and upper air data collected at Caribou NWS station.

Stack parameters used in the modeling for National Starch's facility are listed in Table IV-1. The modeling analyses accounted for the potential of building wake effects on emissions from all modeled stacks that are below their respective formula GEP stack heights.

Boiler #1 can fire both biomass and oil fuels. Boilers #2 and #4 both fire oil. The oil used facility wide is #6 fuel oil with a sulfur content not greater than 0.5%. Therefore, modeling analyses were conducted for two operating scenarios:

Operating Scenario #1with Boiler #1 firing biomass, and Operating Scenario #2 with Boiler #1 firing oil, each with boilers #2 and #4 firing oil.

Table IV-1. Stack Parameters

Facility/Stack	Stack Base Elev. (m)	Stack Ht. (m)	GEP Stack Ht. (m)	Stack Dia. (m)	UTM E (km)	UTM N (km)
CURRENT/PROPOSED						
Stack #1 – Boiler #1 – York Shipley	138.68	20.40	24.37	0.70	556.230	5094.930
Stack #2 – Boiler #2 – NSPS boiler	138.68	23.77	32.80	0.61	556.260	5094.950
Stack #18 – Boiler #4 – Cleaver Brooks	138.68	18.29	24.37	0.51	556.230	5094.950

Emission parameters for National Starch for MAAQS modeling are listed in Table IV-2. Emission parameters for National Starch are based on the maximum license allowed operating configuration. For the purpose of determining NO_2 and PM_{10} impacts, all NO_x and PM emissions were conservatively assumed to convert to NO_2 and PM_{10}, respectively.

Table IV-2. Emission Parameters

Facility/ Stack	Operating Scenario	SO_2 (g/s)	PM_{10} (g/s)	NO_2 (g/s)	CO (g/s)	Temp (K)	Stack Vel. (m/s)
Stack #1 – Boiler #1 – York Shipley firing Biomass	Maximum #1	0.03	0.64	1.16	0.62	449.8	8.99
Stack #1 – Boiler #1 – York Shipley firing #6 fuel Oil	Maximum #2	1.16	0.27	1.00	0.07	449.8	6.57
Stack #2 – Boiler #2 – NSPS firing #6 fuel Oil	Maximum #1 & #2	1.08	0.25	1.03	0.06	449.8	8.00
Stack #18 – Boiler #4 – Cleaver Brooks firing #6 fuel Oil	Maximum #1 & #2	1.03	0.24	0.89	0.06	449.8	11.01

C. Applicant's modeled impacts.

SCREEN3 modeling analyses were performed for the maximum, typical (75% of maximum operating case emission and stack velocity) and minimum (50% of maximum operating case emission and stack velocity) operating cases for National Starch alone. It was demonstrated that the maximum operating load case would result in maximum impacts in simple, intermediate, and complex terrain; thus the typical and minimum load cases were not examined further. No further modeling analysis was needed for CO because maximum 1-hour and 8-hour CO SCREEN3 impacts were well below their respective significance levels.

ISCPRIME refined, using five years of meteorological data, and CI-VM screening modeling were then performed for the operating scenarios outlined above. All SO_2, PM_{10}, and NO_2 averaging periods were significant in both modeling analyses. The model results for National Starch are shown in Table IV-3.

Table IV-3. Maximum Predicted Impacts

Pollutant	Averaging Period	Operating Scenario	ISC-PRIME Maximum Impact Simple Terrain (µg/m³)	Operating Scenario	CI-VM Maximum Impact Complex Terrain (µg/m³)	Class II Significance Level (µg/m³)
SO_2	3-hour	Max Oil	**244.71**	Max Oil	**80.57**	**25**
	24-hour	Max Oil	**88.94**	Max Oil	**22.38**	**5**
	Annual	Max Oil	**11.01**	Max Oil	**7.16**	**1**
PM_{10}	24-hour	Max Biomass	**29.18**	Max Biomass	**7.38**	**5**
	Annual	Max Biomass	**3.53**	Max Biomass	**2.36**	**1**
NO_2	Annual	Max Oil	**9.63**	Max Biomass	**6.46**	**1**
CO	1-hour	Max Biomass	151.97*	Max Biomass	61.07*	**2000**
	8-hour	Max Biomass	106.36*	Max Biomass	42.75*	**500**

Key: * SCREEN3

D. Combined Source Modeling

Because modeled impacts from National Starch were greater than significance levels for all SO_2, PM_{10}, and NO_2 averaging periods, other sources not explicitly included in the modeling analysis must be included by using representative background concentrations for the area. Background concentrations used were based on conservative northern Maine rural background monitoring data for SO_2 from data collected in the Dedham area (Bald Mountain Site), from data collected for PM_{10} from the Bald Mountain site, and from data collected for NO_2 from the Portland area (PEOPL Site). These background values are listed in Table IV-4.

TABLE IV-4. Background Concentrations (µg/m³)

Pollutant	Averaging Period	Background
SO_2	3-hour	52
	24-hour	29
	Annual	5
PM_{10}	24-hour	35
	Annual	15
NO_2	Annual	11

MEDEP-BAQ determined that there were no other sources whose impacts would potentially be significant in the applicant's significant impact area.

The combined source model results for simple and complex terrain are shown in Tables IV-5 & IV-6, respectively. All combined SO_2, PM_{10} and NO_2 averaging period impacts from National Starch including background were below their respective MAAQS.

Table IV-5. Maximum Predicted Impacts in Simple terrain

Pollutant	Averaging Period	ISCPRIME Max Impact (µg/m³)	Receptor UTM E (km)	Receptor UTM N (km)	Receptor Elevation (m)	Back-ground (µg/m³)	Max Total Impact (µg/m³)	MAAQS (µg/m³)
SO_2	3-hour	244.71*	557.00	5095.75	292.60	52	296.71	**1150**
	24-hour	88.94*	556.28	5094.74	140.20	29	117.94	**230**
	Annual	11.01*	556.50	5094.75	146.30	5	16.01	**57**
PM_{10}	24-hour	29.18**	556.28	5094.70	140.20	35	64.18	**150**
	Annual	3.53**	556.50	5094.75	146.30	15	18.53	**40**
NO_2	Annual	9.63*	556.50	5094.75	146.30	11	20.63	**100**

Key: *Boiler #1 burning oil, ** Boiler #1 burning biomass

Table IV-6. Maximum Predicted Impacts in Complex terrain

Pollutant	Averaging Period	CI-VM Max Impact (µg/m³)	Receptor UTM E (km)	Receptor UTM N (km)	Receptor Elevation (m)	Back-ground (µg/m³)	Max Total Impact (µg/m³)	MAAQS (µg/m³)
SO_2	3-hour	80.57*	554.91	5094.70	173.70	52	132.57	**1150**
	24-hour	22.38*	554.91	5094.70	173.70	29	51.38	**230**
	Annual	7.16*	554.91	5094.70	173.70	5	12.16	**57**
PM_{10}	24-hour	7.38**	554.91	5094.70	173.70	35	42.38	**150**
	Annual	2.36**	554.91	5094.70	173.70	15	17.36	**40**
NO_2	Annual	6.46**	554.91	5094.70	173.70	11	17.46	**100**

Key: *Boiler #1 burning oil, ** Boiler #1 burning biomass

E. Summary

In summary, it has been demonstrated that National Starch's facility in its proposed configuration will not cause or contribute to a violation of any SO_2, PM_{10}, NO_2 or CO averaging period MAAQS.

ORDER

The Department hereby grants Air Emission License Minor Revision A-274-71-J-A, subject to the conditions found in Air Emission License A-274-71-I-R, in addition to the following conditions:

The following shall replace Condition 17 of Air Emission License A-274-71-I-R:

(17) **Boiler #2**

A. Boiler #2 shall only fire #6 oil with a maximum sulfur content of 0.5% by weight. Fuel sulfur content shall be documented per 40 CFR 60.48c(f)(2).

B. Emissions from Boiler #2 shall not exceed the following:

Pollutant	lb/MMBtu	lb/hr
PM	0.12	1.96
PM_{10}	n/a	1.96
SO_2	n/a	8.55
NO_X	n/a	8.36
CO	n/a	0.54
VOC	n/a	0.03

Compliance shall be demonstrated through stack testing in accordance with the appropriate method found in 40 CFR Part 60, Appendix A.

C. Opacity of emissions from the #2 boiler stack shall not exceed 30% on a six (6) minute block average basis, except for two (2) six (6) minute block averages in a 3-hour period.

D. Boiler #2 shall vent through Stack #2 which shall be 60 ft AGL.

E. National Starch shall record and maintain records of the amount of fuel combusted in Boiler #2 each day (reference 40 CFR Part 60.48c(g)).

F. Boiler #2 fuel oil sulfur content and Boiler #2 daily fuel use shall be submitted to the EPA on a semiannual basis (every six months). All reports shall be postmarked by the 30th day following the end of the reporting period (reference 40 CFR Part 60.48c(i) and (j)).

G. National Starch shall operate Boiler #2 in accordance with the requirements of Federal New Source Performance Standards (NSPS) 40 CFR Part 60, Subparts A and Dc.

H. National Starch shall perform a tune-up of the combustion system for Boiler #2 on an annual basis, to ensure proper air-to-fuel ratios and good overall boiler efficiency. Compliance will be based on documentation showing the work performed as well as the date on which it was performed.

I. National Starch shall perform a **stack test** to determine the NO_x emission rate, in lb/MMBtu, by June 30, 2001. A **fuel oil analysis** shall be performed at that time as well to determine the fuel bound nitrogen content of the fuel fired during the stack test.

The information gathered will be used to determine if a more representative NO_x emission rate is required. The license may be amended to reflect this finding at that time.

The following shall replace Condition 19 or Air Emission License A-274-71-I-R:

(19) National Starch shall not exceed the facility fuel use of:

- 774,000 gallons per year of #6 fuel (0.5%S maximum by weight) total in Boilers #1 and/or #4, based on a 12 month rolling total.
- 953,672 gallons per year of #6 fuel (0.5%S maximum by weight) in Boiler #2 based on a 12 month rolling total.

Compliance for fuel oil use is based on fuel use logs and the percent sulfur documented on purchase records from the supplier.

The following are new conditions to license A-274-71-I-R:

(25) National Starch shall notify the Department within 48 hours and submit a report to the Department on a quarterly basis if a malfunction or breakdown in any component causes a violation of any emission standard (Title 38 MRSA §605-C).

(26) This amendment shall expire concurrently with Air Emission License A-274-71-I-R.

DONE AND DATED IN AUGUSTA, MAINE THIS DAY OF 2001.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: _____
MARTHA G. KIRKPATRICK, COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: December 8, 2000
Date of application acceptance: December 8, 2000

Date filed with the Board of Environmental Protection: _____

This Order prepared by Mark E. Roberts, Bureau of Air Quality